

FACTORY PRACTICE

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MOLDING GYPSUMS IN THE PRODUCTION OF CERAMIC SANITARY AND TABLE WARE. ADAPTED POROSITY WITH OPTIMAL STRENGTH

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The new improved molding gypsums are used for casting ceramic articles by the conventional and multiple casting (spagless) technologies. Such gypsums increase casting productivity and extend the life cycle of gypsum molds and copies.

Key words: molding gypsum, quality improvement, casting, productivity.

Molding gypsum is obtained at the Samara Gypsum Combine (SGC) by mixing gypsum binders of high grade and purity and definite separation of α and β modifications with the use of modifying additives. All this taken together gives uniformly arranged one-dimensional capillary pores in gypsum molds and provides a high degree of filtration with water absorption 32–38% and gypsum/water ratio 1.43–1.54.

The finely disperse gypsum is easily mixed with water and sets uniformly in the mold, so that the surface of the finished parts is very smooth.

Molding gypsum is produced at the Combine using high-tech automated equipment from M-Tec (Germany), which stabilizes the technical characteristics of the finished product.

Today the Combine produces two types of molding gypsums:

1) molding gypsum 70 (GF70). This product is used in the double-casting technology with mechanized, semiautomatic (FKS, Garoll and so on) as well as non-mechanized stands;

2) molding gypsum 65 (GF65). This product was specially developed for the spagless technology.

A characteristic feature of the spagless technology is the use of gypsum molds with internal voids, which dry rapidly because moisture is displaced by compressed air at low pressure (2–2.5 atm). This significantly increases productivity by increasing the number of operating cycles of the mold per day (3–4 castings, drying time 30–40 min).

Standard tests following GOST 23789–79 are used to confirm the technical characteristics.

The characteristics of the GF70 molding gypsum developed for the conventional casting and the GF65 gypsum for spagless casting are presented in Table 1.

The molding gypsum produced at the Combine is distinguished from the GVVS conventional gypsum (α modification of gypsum) by high turnover of gypsum molds. Depending on the casting technology and slips used this index varies in the range 75–120 turnovers.

TABLE 1. Technical Characteristics of Gypsum at Working Thickness

Index	GF70	GF65
Water/gypsum	0.70	0.65
Gypsum/water*	1.43	1.54
Setting onset, min	8.5	11.5
Setting completion, min	14.5	17.0
Strength in compression, MPa	14.1	14.6
Linear (volume) expansion, %	0.22	0.24
Water absorption, %	38	32.6
Residue on 0.2 mm sieve (200 μ m), %	0.014	0.062
Metal impurities, mg	≤ 1	≤ 1
Bulk density, kg/m ³	644	655
Solidified solution density ρ , g/cm ³	1.13	1.16

* The index gypsum/water (working thickness) is not a requisite quantity and can be adjusted individually by each user depending of the application.

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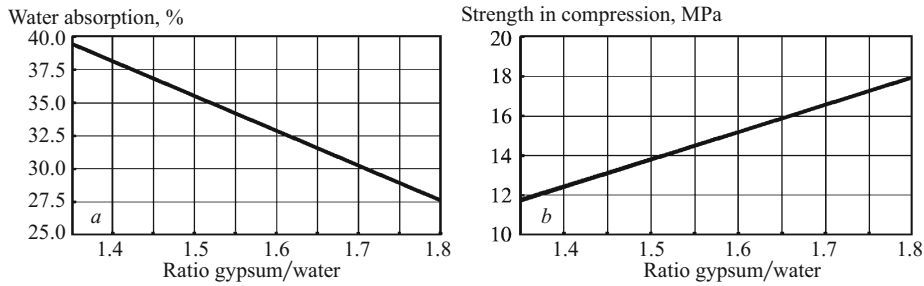


Fig. 1. Molding gypsum (GF70) for the conventional technology. Water absorption (*a*) and strength in compression (*b*) versus the ratio gypsum/water.

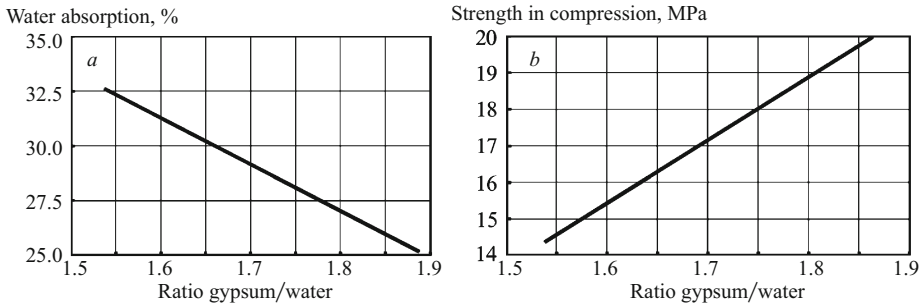


Fig. 2. Molding gypsum (GF65) for the spagless technology. Water absorption (*a*) and strength in compression (*b*) versus the ratio gypsum/water.

The water absorption and mechanical strength versus the ratio gypsum/water of the molding gypsums for the double-casting (conventional) technology and multiple casting by the spagless technology are presented in Figs. 1 and 2.

In summary, the molding gypsums developed and produced at the Samara Gypsum Combine do the following:

- at least double casting productivity (conventional double and multiple casting);
- increase the life cycle of gypsum molds by 20 – 30% as a result of higher turnover compared with the conventional gypsums;

- significantly increase the life cycle of copy mold (by 20 – 25%) as a result of the low linear expansion of the gypsum;

- decrease as a result of adapted porosity the duration of each stage of the production cycle by 20 – 30% in the fabrication of intermediate products.

The combine provides professional technical support and manufacturer's warranties to customers. The Samara Gypsum Combine is the leading Russian producer of high-strength and molding gypsums. Customers orders are filled promptly and on time.